IMPROVING FIRING DATA

OBJECTIVES

- Review Standard Conditions.
- Review the 3 Types of Errors.
- Review the Five Requirements for Accurate .Predicted Fire.
- Discuss ways to improve Accurate Weapon and Ammunition Data through the use of Powder Temperatures and Muzzle Velocity Variations.
- Discuss Meteorological Data and how it is input into and used by the AFATDS.

STANDARD CONDITIONS

- Fire control information is provided for weapons and ammunition based on the assumption that a fixed set of conditions in **Position, Material, and Atmosphere** exist.
- These set of conditions are called **Standard Conditions.**
- Though this precise set of conditions could **never** occur simultaneously, they provide a **starting point** for the computation of data.
- Accurate fires can only be produced when these conditions are accounted for and corrections applied to the firing data.

ERRORS

- Non-standard conditions fall into one of three categories of errors that effect accuracy. These are:
  - **Human Error:** These errors are the result of human mistakes.
  - **Constant Error**: Is a degradation of accuracy caused by constant non-standard factors influencing the firing of the round.
  - **Inherent Error**: These are errors beyond control and impractical to measure. They cause dispersion and are not correctable.

COMPUTATIONAL TECHNIQUE

- Firing Data computed by AFATDS incorporates corrections for all non-standard conditions that are accounted for in the database.
- AFATDS solutions are MET + VE (Met Data + Velocity Error) solutions. The more non-standard conditions that are accounted for, the more accurate the solution.
- AFATDS automatically incorporates corrections for drift, rotation, and projectile weight since these are part of the database.

FIVE REQUIREMENTS FOR ACCURATE PREDICTED FIRE

- The five requirements for accurate predicted fire are:
  - Accurate Weapon Location
  - Accurate Target Location
  - Accurate Weapon and Ammunition Data
  - Meteorological Data
  - Accurate Computational Techniques
- During this lesson we will discuss **Accurate Weapon and Ammunition Data** and **Meteorological Data.**

ACCURATE WEAPON and AMMUNITION DATA

- We can improve **ammunition data** by ensuring that the **correct projectile weight** is entered in our munitions files as previously discussed in data base construction.
- We must ensure that an **accurate propellant temperature** is recorded and updated periodically for each howitzer.
- We can also improve **weapon data** by storing previously measured (historical) **muzzle velocities** or calibrating the howitzers.

PROPELLANT TEMPERATURES

- Propellant Temperatures must be stored for each individual howitzer in the database. To do this:
  - Click 1 on **Units> Edit this Unit.**
  - Double Click 1 on **Weapon, Highlight Gun #1** and click 1 on **Edit.**
  - Powder Temp field enter: **50** and **<OK>**
  - Repeat the process for Guns: **2 - 6**

MUZZLE VELOCITY VARIATIONS

- Muzzle Velocities (MV's) or Muzzle Velocity Variations (MVV's) can come from two sources:
  - **Historical** Records
  - **Measured** with the M94 Chronograph.
- We will learn how to enter both.

HISTORICAL MUZZLE VELOCITY

- Historical Muzzle Velocities come in the form of Muzzle Velocity Variations (MVV’s), they are variations from the standard or expected muzzle velocity for a given charge that has been measured during a previous operation.
- Standard or Expected Muzzle Velocities can be found in the appropriate Tabular Firing Table (TFT) for example TFT AM2.

HISTORICAL MUZZLE VELOCITY

- To enter a **Historical Muzzle Velocity**:
- Click 1 on **Units> Edit this Unit**
- Double Click 1 on **MVV Data**. (data is displayed for Gun #1) if another Gun # is desired select the appropriate gun #.
- Click 1 on the **Proj Model Field** on the first blank line and select **M107DC**
- Click 1 on the **Prop Model Field** and Select **M4A2**

HISTORICAL MUZZLE VELOCITY

- Click 1 on the **Prop Lot Field** and Select **W**
- Click 1 on the **Prop Chg Field**
- Select Charge **Six**
- Click 1 on the **MVV Field** and enter **–2.1**
- Click 1 in the **Type Field** and select **Historical**
- Click 1 on the **Save Icon**

HISTORICAL MUZZLE VELOCITY

Enter **Historical MVV's** for the remaining guns:

- **#2, M107DC, M4A2, Lot W, Chg 6, -2.5**
- **#3, M107DC, M4A2, Lot W, Chg 6, -3.4**
- **#4, M107DC, M4A2, Lot W, Chg 6, -1.6**
- **#5, M107DC, M4A2, Lot W, Chg 6, -2.9**
- **#6, M107DC, M4A2, Lot W, Chg 6, -4.1**

MEASURED MUZZLE VELOCITIES

- Muzzle Velocities can be **measured** while firing using the M94 Chronograph.
- A **number of usable rounds** (normally 6) are **recorded** at each howitzer, along with a starting and ending **Propellant Temperature**.
- This data is then **entered** into the AFATDS and automatically **converted** to a **MVV**.

ENTERING A MEASURED MV

- Click 1 on **Units> Edit this Unit**
- Double Click 1 on the **MVV Data File**
- Click the appropriate weapon # **(Gun 1)**
- Click 1 on **<MVV Calculator>**
- Select Projectile Model: **M107DC**
- Projectile Weight: **95.0**
- Propellant Model: **M3A1**

ENTERING A MEASURED MV

- Propellant Lot: **G**
- Propellant Charge: **FOUR**
- Powder Temperature(average): **52**
- Fuze Model: **M557**
- Enter each Measured Muzzle Velocity:
  314.3, 315.7, 315.2, 315.0, 314.6, 314.8
- Click 1 on **Compute**: Results: **-0.26**
- Click 1 on **Store**

ENTERING A MEASURED MV

Enter the remaining MV's, all guns calibrated with **M107DC, 95.0 Lbs, M3A1, Lot G, Chg 4, Fuze M557**.

#2 Prop Temp: **55**, MV's **313.6, 312.9, 312.6, 311.9, 313.8, 312.4**

#3 Prop Temp: **58**, MV's **310.2, 310.9, 310.7, 309.5, 309.4, 309.7**

#4 Prop Temp: **62**, MV's **317.4, 317.6, 316.8, 318.5, 318.0, 318. 2**

#5 Prop Temp: **65**, MV's **307.3, 307.6, 306.8, 308.0, 306.5, 307.5**

#6 Prop Temp: **48,** MV's **320.6, 320.3, 321.1, 320.7, 319.8, 319.5**

RESULTS

- **#2 –2.46**
- **#3 -5.39**
- **#4 +2.12**
- **#5 -8.48**
- **#6 +5.33**

AFATDS METEOROLOGICAL FILES

METEOROLOGICAL MESSAGES

- AFATDS has the ability to store and receive the following types of Met Messages: (Click 1 on **MET** on the AFATDS **Current Menu Bar**)
  - **CM**: Computer Met
  - **CFL**: Fall Out
  - **TALL**: Target Area Low Level
  - **TA**: Target Acquisition
  - **SO**: Surface Observation
  - **FO**: Forecast

COMPUTER MET

- The following MET has been received through voice communications:
- **METCM1 342161 230130 085019**
- 00 **160 003 3017 1019** 04 **419 012 2942 0833**
- 01 **316 005 3004 1007** 05 **439 014 2909 0883**
- 02 **272 013 3003 0979** 06 **410 013 2877 0785**
- 03 **390 009 2977 0935** 07 **390 011 2835 0699**

COMPUTER MET

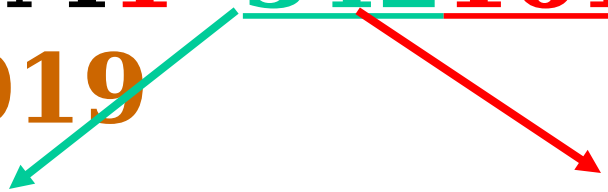
- To enter a Computer Met from the keyboard:
- Click 1 on **View CM**
- The Standard is displayed, if this is going to be used the Center Of Battery altitude should be entered as the station altitude.

METCM1 342161 230130 085019

Identifies as a Computer Met

Indicates the Octant

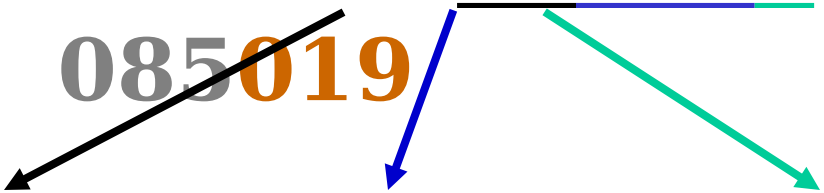
METCM1 342161 230130
085019



Latitude **Longitude**

METCM1 342161 230130

085019



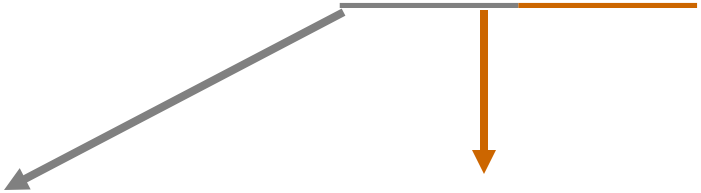
Date Time Duration

Note: The last digit of the time is in tenths of an hour.

60 minutes / 10 = 6

6 x 3 = 18 Time entered will be 0118

METCM1 342161 230130 085019



Station Altitude — **Atmospheric Pressure**

Note: Station Altitude is in tens of meters. If the map altitude is 850 it will be entered as 085.

THE ID LINE

- **METCM1 342161 230130 085019**
  - Click 1 on Valid From: **Enter 230118Z*monyy***
  - Click 1 on Valid To: **Enter 230618Z*monyy***
    - **Mets are valid for 4 hours the extra hour is a buffer**
  - Click 1 on Latitude Field: **Enter 342**
  - Click 1 on Longitude Field: **Enter 161**
  - Click 1 on Altitude Field: **Enter 085**
  - Click 1 on Atmospheric Pressure: **Enter 019**
  - Click 1 on Global Octant: **Enter Northern Hemisphere, 90W - 180**

THE BODY

- 00 **160 003 3017 1019** 04 **419 012 2942 0833**
- 01 **316 005 3004 1007** 05 **439 014 2909 0883**
- 02 **272 013 3003 0979** 06 **410 013 2877 0785**
- 03 **390 009 2977 0935** 07 **390 011 2835 0699**
- Click 1 on Line 00 Wind Dir: **Enter 160**
- Click 1 on Line 00 Wind Speed: **Enter 003**
- Click 1 on Line 00 Air Temp: **Enter 301.7**
- Click 1 on Line 00 Air Press: **Enter 1019**
- Enter Line **01-07** in the same manner.

MAKING THE MET CURRENT

- In order for AFATDS to use this MET Message it must be made current.
- ***The Operations Chief should check this MET to ensure it is VALID!!***
  - Click 1 on **Make Current**
  - Click 1 on **Met, View CM**

TRANSMITTING & RECEIVING A MET

- With the current met window opened:
  - Click 1 on **Send, Highlight the Adjacent FDC**, and click 1 on **OK.**
- At the receiving FDC: The **MET Icon** on the AFATDS Current Bar darkens
  - Click 1 on the **MET ICON**
- ***The Operations Chief will check to ensure MET is valid.***
  - Click 1 on **Make Current**.

- If a new MET is received that has fewer lines than the current MET the old lines will be used. To avoid this;
  - Leave the new Met in the MET Icon.
  - Select **MET> View CM>** Category: select **Standard** and **<Make Current>**
  - Display the MET Icon and **<Make Current>**

QUESTIONS???

SUMMARY

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- Reviewed the 3 Types of Errors.
- Reviewed the Five Requirements for Accurate .Predicted Fire.
- Discussed ways to improve Accurate Weapon and Ammunition Data through the use of Powder Temperatures and Muzzle Velocity Variations.
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